

Appl. No. 10/706,392
Amdt. dated May 18, 2005
Reply to Office action of February 18, 2005

Amendments to the Specification:

Please replace the Abstract, with the following rewritten Abstract:

A main body 11 of jewelry 1 has an inlaid portion of concaved shapes sized to a decorating parts 12. Decorating parts 12 made of copper alloy containing 6 to 15 weight percentage of copper and 94 to 8 weight percentage of god. A main body 11 are composed of materials commonly used in jewelry, such as gold alloy, silver, platinum and the like.

Please replace the originally filed specification with the marked up copy of the substitute specification filed herewith.

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Filed: 12 November 2003
Applicant: Kuniya Maruyama

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COPPER COLORED JEWELRY AND METHOD OF MANUFACTURING COPPER

COLORED JEWELRY

Background of the Invention

The present invention relates to jewelry, in particular, jewelry made of a copper alloy, and to a method of manufacturing such jewelry.

Conventionally, copper alloy containing 0.5 through 5 weight percent gold (so called "Shakudo") is a traditional Japanese metal used for manufacturing "Katana no Tsuba" (i.e., Japanese sword guards) and "Kanzashi" (i.e., Japanese style hairpins). It has a beautiful light pink color in original.

However, conventional "Shakudo" contains 95 weight percent or more copper and, thus is easily oxidized and discolored after daily use. Thus, it is rarely used in manufacturing modern jewelry such as rings and pendants. Additionally, after conventional "Shakudo" alloy is oxidized, it turns black or dark purple. The beauty of "Shakudo" alloy is lost and its original color cannot be recovered due to the degree of oxidation.

Moreover, "Shakudo" alloy is soft and sticky compared to other metals used for making jewelry, such as 14K or 18K gold or platinum. Therefore, because of the solidness required for jewelry to be used daily, "Shakudo" alloy is rarely used as a material to form jewelry. Consequently, when "Shakudo" alloy is used for modern jewelry manufacturing, it is common to be mixed with a gold alloy 21 such as in a ring 20 shown in Fig. 3. It was often called "Mokume jewelry" by embodying a pattern of wood grain 22 in the tarnished portion of "Shakudo".

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Furthermore, "Shakudo" sometimes is used as a decoration in flat shaped jewelry such as brooches. However, this produces other problems. Because of the difference in the nature of materials, a so-called inlaying technique must be applied for manufacturing such a jewelry. For example, a "Shakudo" decorating part is inserted into a concave inlay area formed in a main body made of other materials such as a gold alloy by pressing using a jewelry tool such as a hammer and then polished very hard together. It is not only difficult to inlay "Shakudo" securely in the other material unless jewelry is very flat, but the inlaid portion protrudes after long term use because of differences in the metals.

Summary of the Invention

I have determined that it is possible to keep "Shakudo" in original beautiful light pink color if the copper alloy contains strikingly less copper than the conventional "Shakudo", when it is polished after it is oxidized and discolored dark. It also provides unique jewelry by changing color from pink to dark brown after the oxidation is complete.

It is also provides a new type of "Shakudo" jewelry, which can be used to produce curved jewelry, such as rings, pendants, earrings, etc., in addition to flat jewelry such as brooches.

That is, the copper alloy of the present invention contains 6 to 15 weight percent copper and 94 to 85 weight percent gold. The copper alloy is a light pink color in original and a fancy chocolate color after it has oxidized. The light pink color can be recovered by a cleaning process including washing and polishing surface.

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Further, in accordance with another aspect of the present invention a flux is applied to the body of the jewelry before a decorating portion made of the copper alloy is inserted into an inlay area formed in the main body of the jewelry, the main body being made of the other materials such as gold, silver, or platinum. Therefore, the decorating portion made of the copper alloy can be inlaid securely in the inlay area formed in main body of jewelry, even though main body of jewelry is formed in curved shape.

Therefore, jewelry of the present invention is made of a main body with an inlay area and a decorating part made of the copper alloy which is inserted into the foresaid inlaid portion; the copper alloy containing 6 to 15 weight percent copper and 94 to 85 weight percent gold.

With the composition of the copper alloy of the present invention, jewelry made with the copper alloy has an original beautiful light pink copper color. The jewelry then oxidizes very slowly, and only at its surface, to a dark color. This changing color from pink to chocolate provides enjoyment.

Further, jewelry of the present invention includes items such as rings, pendants, necklaces, earrings, cuff buttons, brooches, tie tacks, bangles, buckles, chokers, bracelets, watch bands and glasses which have, at least in part, a curved surface.

With jewelry of the present invention, any form of jewelry can be provided using copper alloy which is changeable color from an original light pink copper color to the dark brown color of fancy chocolate as a unique decoration.

Furthermore, A a method of manufacturing jewelry includes forming a main body of jewelry having an inlay area inlaid portion, forming a decorating part made of foresaid

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the copper alloy which is inserted into the inlay area, a flux is applied at the joint surface of inlay area and/ or a surface of decorating part, inserting a decorating part into the inlay area of main body by pressing. Then, a main body of jewelry is then heated and soldering is applied.

With the method, flux which is applied between joint surface of inlay area and decorating part evaporates spontaneously from the heat generated when soldering after decorating part is inserted. Therefore, the evaporated flux forms a slight gap (space) between inlay area and decorating part, the solder flows naturally into the gap (space), so that decorating part made of the copper alloy is attached securely to the main body. This makes it possible to form copper alloy jewelry having curved shape.

Still further, the surface of the jewelry made in accordance with the above method can be cleaned after the color has changed to dark brown due to oxidization by washing and polishing.

With the process, chocolate color of oxidized copper alloy is recovered easily to light pink original copper color and users of the jewelry can enjoy the change of color of copper.

Brief Description of the Drawings

Fig. 1 is a drawing showing an item of jewelry of the present invention,

Fig. 2 (a) through (d) are drawings illustrating the method of manufacturing jewelry of the present invention, and

Fig. 3 is a drawing showing conventional jewelry using "Shakudo".

Detailed Description of the Preferred Embodiments

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Referring now to the drawings, preferred embodiments of the present invention are described more particularly. Incidentally, in the description, a ring represents an item of jewelry of the preferred embodiment of the present invention.

Fig. 1 is a drawing showing jewelry relating to the preferred embodiment of the present invention. The jewelry 1 has a main body 11 formed as a flat ring shape. Main body 11 has an inlay area 14 which is capable of receiving a decorating part. As shown in Fig. 1, two decorating parts 12 are already installed in the inlay area.

Main body 11 can be made of any material commonly used in manufacturing jewelry, such as 12K, 14K or 18K gold alloy, silver and/or platinum alloy. Additionally, the main body 11 has a concave inlay area sized adjust to the decorating parts 12. Main body 11 is formed by a common method of manufacturing jewelry such as lost wax casting, press cutting, and hand making.

The decorating part 12 is installed in the inlay area of main body 11 by inlaying technique (so-called "Zogangihou"). The decorating part 12 is composed of a copper alloy containing 6 to 15 weight percent copper and 94 to 85 weight percent gold. The decorating part 12 has a light pink color initially and the copper alloy is only oxidized on it's surface and the oxidation occurs very slowly. This is due to the fact that the copper alloy contains much more gold (and hence, less copper) than the conventional "Shakudo".

Therefore, the decorating part 12 can recover the original light pink color by cleaning after the surface is turned to dark brown. Conventional metal forming methods can be applied to form the decorating part 12. For example, an ingot of the copper alloy

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is adjusted to a preferable thickness by roller and the plate of copper alloy is formed to a preferable shape by press cutting or by hand.

The main body 11 also has decorating surface 13 which adds another decoration to the jewelry 1. The decorating surface 13 is not essential for jewelry 1 and it can be formed in any conventional jewelry manufacturing technique, such as engraving, enameling, matte finishing or many small diamonds setting.

Fig. 2 shows a method of manufacturing jewelry relating of the present invention. Figs. 2 (a) and 2 (b) are sectional views showing the inlaying of a decorating part 12 into an inlay area 14 of the main body 11 of the jewelry. This main body 11 can be the main body of a ring, pendant, necklace, earring, cuff button, brooch, tie tack, bangle, buckle, choker, bracelets, watch band or glasses. Fig. 2 (c) is a top view of Fig. 2 (b) from a direction of C showing a step of placing solder on the border between decorating part 12 and main body 11 on the surface of main body 11. Fig. 2 (d) shows the solder having flowed inward and reached into the joint surface of decorating part 12 and main body 11.

For the first step of the method of manufacturing a jewelry, a few inlay areas of concave shape are formed in main body 11 by the foresaid manufacturing method which are adjusted to the shape of decorating part 12. Also, a few of decorating parts 12 are obtained by the foresaid manufacturing method. The decorating parts are composed of the copper alloy which contains 6 to 15 weight percent copper and 94 to 85 weight percent gold.

For the next step, each decorating part 12 is inserted into an inlay area 14 formed in main body 11 as shown in Fig. 2 (a).

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In this step, a flux 15 is pre-applied to joint surfaces of the inlay area 14 and/or the decorating part 12. Flux 15 is preferably a liquid type flux but is not limited to any special type of flux.

To insert the decorating part 12 into the inlay area 14, jewelry making tools such as hammers are used. Using the jewelry making tools, the decorating part 12 is pushed very hard in the direction of an arrow B. Consequently, flux 15 which was applied on the joint surface is sandwiched between the decorating part 12 and the inlay area 14.

For the third step, each joint surface between the decorating part 12 and the main body 11 are soldered. As shown in Fig. 2 (c), solder 16 are placed in parallel on the surface of the border of the main body 11 and the decorating part 12. Then the main body 11 is heated using a jewelry making tool such as a burner. Solder 16 is not limited to any special type of solder.

When the main body 11 is heated, such as by a burner, the flux 15 applied to the joint surfaces evaporates. Consequently, a slight gap emerges at the joint surfaces between the decorating part 12 and the main body 11 and melted solder 16 spontaneously flows into the gap with the help of so called the interfacial effect of the flux. Therefore, even though the decorating part 12 and the main body 11 are formed to the curved shape, the decorating parts 12 are securely installed in the main body 11 and will not protrude from the main body 11, even after daily use for a long time.

As a further step of the present invention, the original light pink color of the decoration can be recovered after it has oxidized. A cleaning treatment can be applied to the jewelry 1 invention after the decorating part 12 has oxidized and turned dark brown to recover its original light pink color.

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The cleaning method of jewelry 1 includes, for example, acid washing, ion washing, rubber polishing, knife polishing, charcoal rubbing, buffing etc. The cleaning method can be applied repeatedly for darken decorating part 12 after long time daily use.

By applying foresaid polishing processes, the original light pink color of the copper alloy is recovered, because only the surface is oxidized in jewelry 1. The cleaning process can be applied repeatedly after the surfaces of the decorating part 12 turns dark brown.

The present invention is not limited to the above-mentioned embodiments. For example, only a flat type of ring is described above but any type and any form of jewelry such as tiffany type of ring, pendants, necklaces, earrings, cuff buttons, brooches, tie tacks, bangles, buckles, chokers, bracelets, watch band, glasses and the like can be formed using the method of the present invention.

Further, materials of the main body of jewelry is not limited to aforesaid embodiments. For example, not only gold alloy is used for main body of jewelry, but any type of material is used as long as it can withstand soldering.